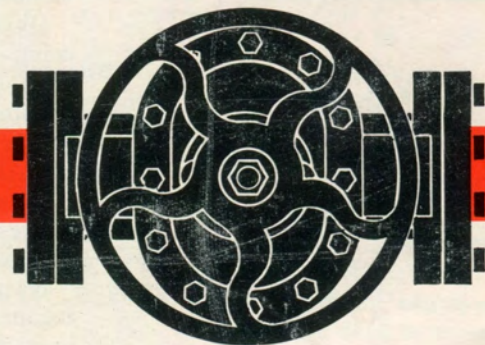


piping pointers

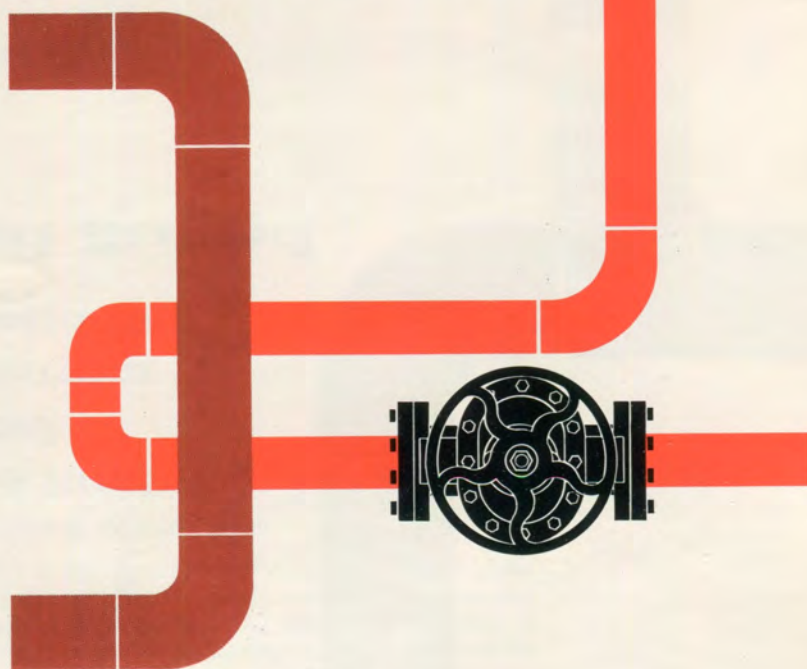
application and
maintenance of
valves and
piping equipment



CRANE

piping pointers

a CRANE manual
prepared especially
for men who
maintain industrial
piping systems



**piping
pointers**

See it in motion pictures

The contents of this brochure are presented also in a motion picture with the same title: "Piping Pointers". The film, like the booklet, deals with the fundamentals of basic valve and fitting types . . . and provides elementary instruction on the proper handling, installation, and maintenance of such equipment in piping systems. It is particularly appropriate for engineering colleges, industrial audiences, and maintenance personnel.

The film is 16 mm. with sound and runs about 28 minutes. Prints are available on a loan basis, free-of-charge except for return postage. Requests should indicate preferred and alternate showing dates.

The title of this booklet tells its purpose: *to help you do a better job in maintaining piping systems at peak efficiency.*

Obviously, this new revised edition of "Piping Pointers" is not a complete treatise on piping maintenance. Aside from its not being possible in a booklet this size, it was not intended as such. Mainly, "Piping Pointers" was produced to encourage good understanding of the fundamentals of sound practices in piping installation and maintenance.

Thus the content is confined entirely to basic subject matter, and is presented in brief, easy-to-read form. It is hoped that such treatment will encourage regular and frequent reference to "Piping Pointers."

Naturally, this manual will be of greater value to piping maintenance trainees and semi-skilled mechanics than to the long-experienced men. To the latter, "Piping Pointers" is suggested as a refresher in the fundamentals.

In either case, however, Crane Co. urges that you continue at the same time to rely on your Crane Catalog for complete information on all types of valves, fittings, and piping specialties. Your Crane Distributor is always glad to help when you need specific information of any sort not given in the catalog.

Additional copies of "Piping Pointers" may be secured through your Crane Distributor.

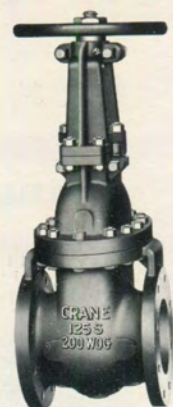
piping pointers

information about the application and maintenance of piping equipment

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how to choose valves for every service



gate valve
outside screw and yoke



cock, square head



angle valve



pop safety valve



check valve
horizontal lift



swing check valve



globe valve

When in doubt as to which valves and fittings are best suited, don't guess. It's a risky way to equip any piping system. And it's completely unnecessary. Your Crane Catalog will give you the exact information you need.

First of all, you should know where the piping materials are going to be used. Are they to be on high or low pressure/temperature installations? What kind of fluids will be sent through them? Will the conditions of operation be moderate or severe? How much headroom must you allow for valve stems? What size will your pipe lines be? Will the valves have to be dismantled frequently for inspection and servicing? If your installation is to be relatively permanent, or must the piping be broken into frequently?

When you can answer these questions, you'll know which valves to choose. You'll know their operating characteristics, which materials you'll need, their relative strength in service, what kind of end connections are best suited to your installation . . . in short, you'll know which of the many types and sizes of valves are needed to do your job most efficiently.

the principal functions of valves

1 starting and stopping flow

This is the service for which valves are most generally used—starting and stopping flow. Gate valves are excellently suited for such service. Their seating design, when open, permits fluid to move through the valve in a straight line with minimum restriction of flow and loss of pressure at the valve. The gate principle explained on page 6 is not practical for throttling.

2 regulating or throttling flow

Regulating or throttling flow is done most efficiently with globe or angle valves. Their seating design causes a change in direction of flow through valve body, thereby increasing resistance to flow at the valve. Globe and angle valve disc construction permits closer regulation of flow. These valves are seldom used in sizes above 12 inches, owing to the difficulty of opening and closing the larger valves against pressure.

3 preventing back flow

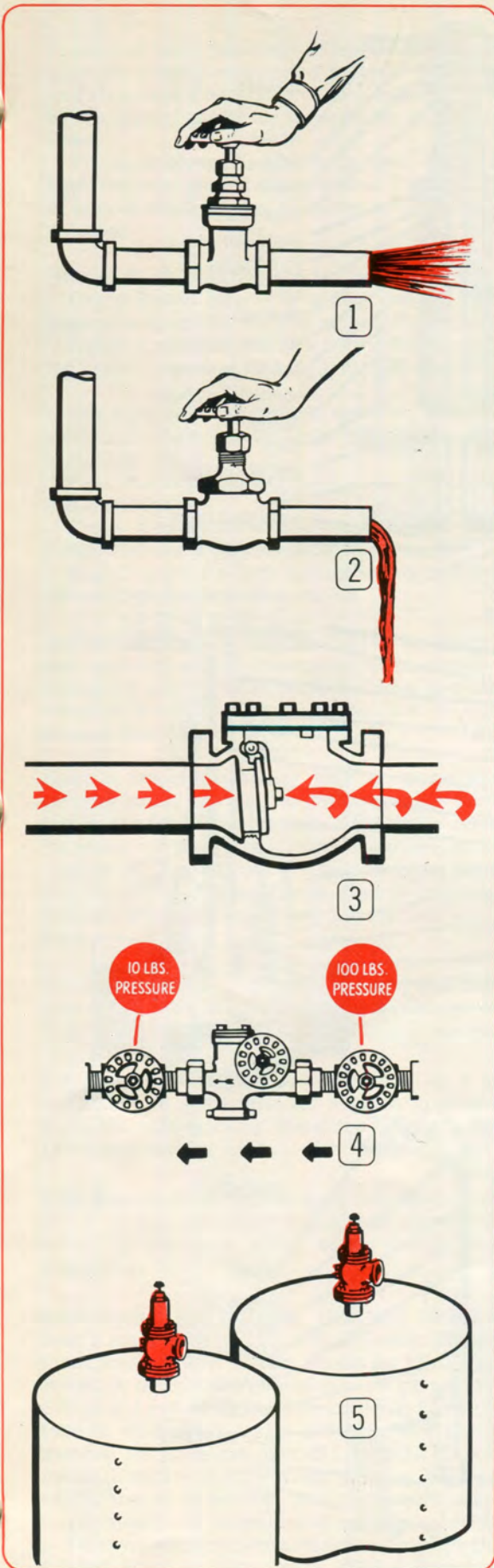
Check valves perform the single function of checking or preventing reversal of flow in piping. They come in two basic types: swing and lift checks. Flow keeps these valves open, and gravity and reversal of flow close them automatically. As a general rule, swing checks are used with gate valves—lift checks with globe valves.

4 regulating pressure

Pressure Regulators are used in lines where it is necessary to reduce incoming pressure to the required service pressure. They not only reduce pressure, but maintain it at the point desired. Reasonable fluctuations of inlet pressure to a regulator valve do not affect outlet pressure for which it is set.

5 relieving pressure

Boilers and other equipment subject to damage from excessive pressures should be equipped with safety valves. They usually are spring loaded valves which open automatically when pressure exceeds limit for which the valve is set. These valves are known as Safety Valves and Relief Valves. Safety Valves are generally used for steam, air, or other gases. Relief Valves are usually used for liquids.



names of parts of basic valve designs

cock

plug
body
washer
nut

relief

cap
lock nut
spring adjusting screw
spring
body
stem
locking plug
seat
blow-back regulating ring
disc
disc guide
base

swing check

cap bolts
cap
disc hinge pin
disc hinge
disc face
disc hinge nut
disc
body seat ring
body

lift check

cap
union cap ring
disc
body seat ring
body

gate

wheel
yoke sleeve nut
yoke
yoke sleeve
gland flange
gland bolts
gland
packing
stuffing box
bonnet bushing
bonnet joint bolts
bonnet
stem
disc seat rings
disc
body seat rings
body

globe

wheel
wheel nut
stem
packing nut
gland
packing
stuffing box
bonnet
union bonnet ring
disc stem ring
lock washer
disc
body seat ring
body

angle

wheel
wheel nut
stem
packing nut
packing
bonnet
disc stem ring
disc
body

It pays to know the range of materials from which valves, fittings, and pipe are usually made; and to understand the pressure, temperature, and structural limitations of each material. For it may be highly unsafe to use certain materials for services beyond their recommended maximum.

Piping equipment commonly used in industry falls into the three basic material groups shown below. There are, also, one or more variants in each of these groups, and each variant has individual service characteristics.

Bronze should not be used for temperatures exceeding 550 F.

Crane Steam Bronze is widely used in valves and fittings for temperatures up to 450 F. It is an alloy of copper, tin, lead, and zinc.

Crane Special Bronze is a high grade alloy used in piping equipment for higher pressures and for temperatures up to 550 F.

Crane Cast Iron is regularly made in three grades—Cast Iron, Ferrosteel, and High Tensile Iron. It should not be used for temperatures exceeding 450 F.

Cast Iron is commonly used for small valves and fittings having light metal sections.

Crane Ferrosteel, stronger than cast iron, is used for valves and fittings having medium metal thicknesses.

High Tensile is a high strength alloy cast iron and is used principally for castings for large size valves.

Malleable iron is particularly suited for use in screwed fittings, unions, etc., and also is used to some extent for valves and flanges. It is characterized by pressure tightness, stiffness, and toughness and is especially valuable for piping materials subject to expansion and contraction stresses and shock.

Steel is recommended for high pressures and temperatures and for services where working conditions, either internal or external, may be too severe for bronze or iron. Its superior strength and toughness, and its resistance to piping strains, vibration, shock, low temperature, and damage by fire afford reliable protection when safety and utility are desired. Many different types of steel are both necessary and available because of the widely diversified services steel valves and fittings perform.

In addition to the maker's brand and size mark, a basic service rating appears on most valves and on many fittings. Pressure and temperature ratings are expressed in terms of steam, unless otherwise indicated.

Steam Ratings. Steam ratings are used as a basis for determining the suitability of a material for a given application. For lower temperatures the safe working pressure of a material is usually greater than the steam rating.

Cold Ratings. Most valves have two service ratings. In addition to the steam rating, explained above, cold service ratings are usually designated by the mark WOG, which stands for cold water, oil, or gas, non-shock.

Steel Ratings Are Different. Cast and forged steel valves and fittings bear a mark such as 150, 300, 600, etc. These figures denote the maximum pressure at a certain maximum temperature for which an item is suited. A certain 600-pound steel valve, for example, may be suited for 600-pound pressure at temperatures up to 850 F. But if the temperature exceeds that point, up to 1000 F, let's say, the valve is not recommended for pressures over 170 pounds. This important effect of temperature makes it imperative to know both pressure and temperature conditions of a service, and to consult the manufacturer's service recommendation tables before selecting steel materials for it.

Temperature and pressure are not always the only factors to be considered, however. Frequently, steel materials are used for their structural ability to meet unusually severe conditions beyond the range for which brass or iron are recommended, such as shock, vibration, line stresses, fire hazard, etc.

common materials of
which valves and
fittings are made
*selection of piping equipment
starts here*

bronze

steam bronze
special bronze

cast iron

cast iron
ferrosteel
high tensile

malleable iron

steel

cast steel
forged steel
alloy steels

how to read service rating marks



basic valve designs most widely used in piping systems

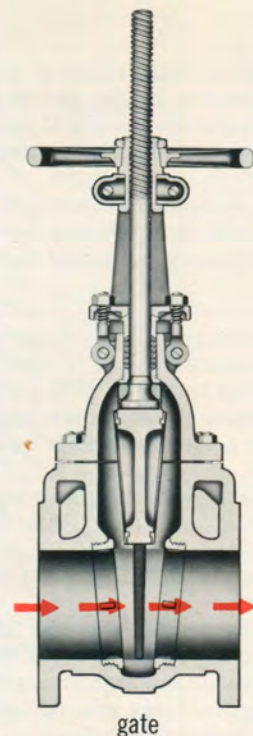
how they operate

gate valves

As shown at the right, fluids flow through gate valves in a straight line. This construction offers little resistance to flow and reduces pressure drop to a minimum. A gate-like disc—actuated by a stem screw and handwheel—moves up and down at right angles to the path of flow, and seats against two seat faces to shut off flow.

Gate valves are best for services that require infrequent valve operation, and where disc is kept either fully opened or closed. *They are not practical for throttling.* With the usual type of gate valve, close regulation is impossible. Velocity of flow against a partly opened disc may cause vibration and chattering, and result in damage to the seating surfaces. Also, when throttled, the disc is subjected to severe wire-drawing erosive effects.

The plug gate valve, however, is excellently suited for throttling service.

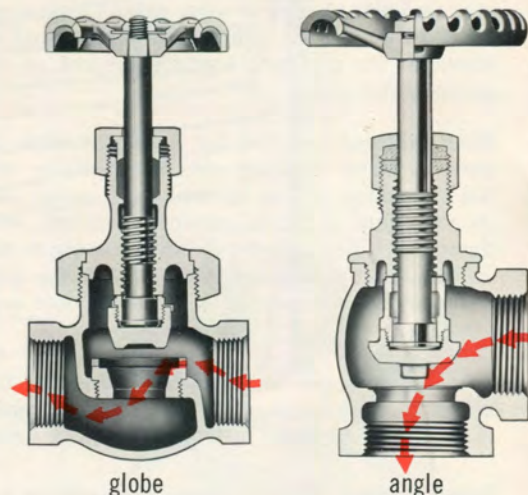


globe and angle valves

As shown at left, fluids change direction when flowing through a globe valve. This seating construction increases resistance to—and permits close regulation of—fluid flow.

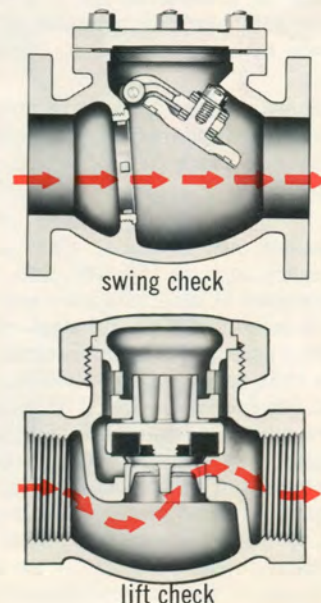
Disc and seat can be quickly and conveniently re-seated or replaced. This feature makes them ideal for services that require frequent valve maintenance. Shorter disc travel saves operators' time when valves must be operated frequently.

Angle valves, shown at the right, have the same operating characteristics as globe valves. Used when making a 90 degree turn in a line, an angle valve reduces the number of joints and saves make-up time. It also gives less restriction to flow than the elbow and globe valve it displaces.



check valves

Being non-return valves, check valves are used to prevent back-flow in lines. In operating principle, all check valves conform to one of two basic patterns. Shown above is the swing check type. Flow moves through these valves in approximately a straight line comparable to that in gate valves. In lift check valves, shown below, flow moves through the body in a changing course as in globe and angle valves. In both swing and lift types, flow keeps the valve open while gravity and reversal of flow close it automatically.



main variations of gate valve designs by type of disc

service characteristics

solid wedge disc

The solid wedge-shaped disc is the most common gate valve seating principle. It is the ultimate in simplicity, the disc consisting of a single moving part.

Valves with solid wedge disc can be installed in any position without danger of the disc jamming. This type of disc is recognized as the best for steam services. Wedge disc seating is available in brass, iron, and steel gate valves.

double disc

The double disc makes closure by descending between two parallel or tapered seats in the valve body. Double discs with parallel faces, after being lowered into position, are seated by being spread *against* body seats. A disc spreader makes contact with a stop in the bottom of the valve and forces discs apart. Double wedge discs are seated between tapered seats in the body and do not require spreaders.

Valves with double discs are widely used on non-condensing gas and liquid services at normal temperatures, as in the water works and sewage fields, and in the oil and gas industries. For most satisfactory operation, double disc valves should be installed with the stem vertical and the handwheel up.

plug disc

In the plug gate valve, available only in corrosion-resistant alloys, the disc is cone shaped instead of having flat faces. It offers all the advantages of the solid wedge gate, in addition to which it is excellently suited for throttling service.

main variations of globe valve design by type of disc

service characteristics

plug type disc

The wide bearing surfaces of the long, tapered plug type disc and matching seat offer highest resistance to the cutting effects of dirt, scale, and other foreign matter. This feature makes plug type disc seating the best choice for the toughest flow control services, such as throttling, drip and drain lines, soot blowers, blow-off, and boiler feed lines.

Valves with plug type discs and seats are available in a wide variety of materials either in globe or angle patterns.

composition disc

The flat face of the composition disc seats—like a cap—against the seat opening. Disc unit consists of a metal disc holder, composition disc, and retaining nut.

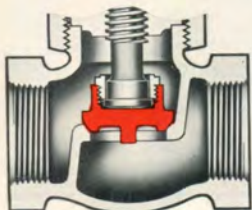
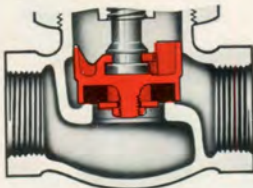
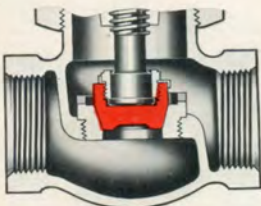
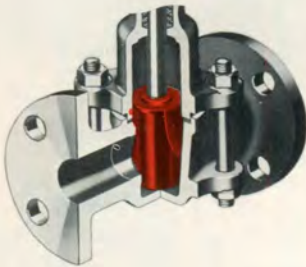
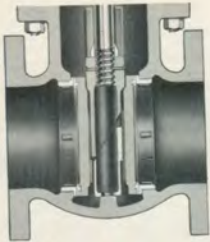
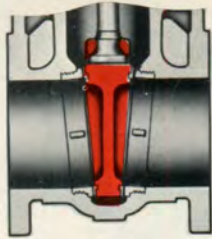
Discs are available in different compositions suitable to a variety of services such as air, steam, hot and cold water, oil, gas, and gasoline. By changing the type of disc the valve can be changed over from one service to another. Disc can be renewed quickly in case of leakage.

Composition discs are suitable to all moderate pressure services except throttling, at temperatures as recommended. They often will stand imbedding of dirt without leaking. Available in brass and iron valves only.

conventional disc

In contrast to the plug type disc, note the thin line contact achieved by the taper of the conventional seat with the face of the disc. Because this narrow line bearing serves to break down hard deposits that form on the seats in some services, pressure-tight closure is assured.

Conventional disc valves are widely used for many cold and hot services. Valves with conventional seatings are available in brass, iron, steel and alloy materials.



check valves available in swing and lift types

each has many variations

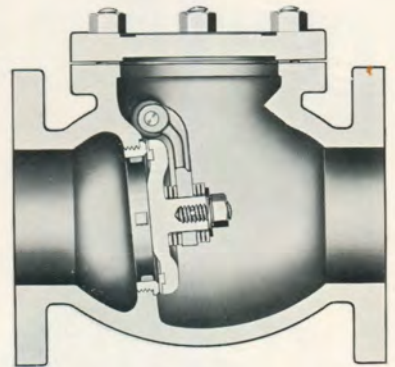
Although all check valves fall into two basic categories, swing and lift, each has many variants. Swing checks, for example, are available in straight-way and "Y" patterns. Some have regrindable metallic discs, others, non-metallic disc facings. Outside lever and weight may be attached when necessary to increase sensitivity to flow.

Lift checks are made in horizontal globe and angle patterns. Other types of lift check valves are: automatic stop-check, ball disc, vertical, and cushioned disc.

basic swing check design

Because fluid flow through the valve body approximates straight line flow, swing check valves offer less resistance to flow than lift checks. Swing checks are, therefore, widely used for all pressure services, and especially on liquid lines.

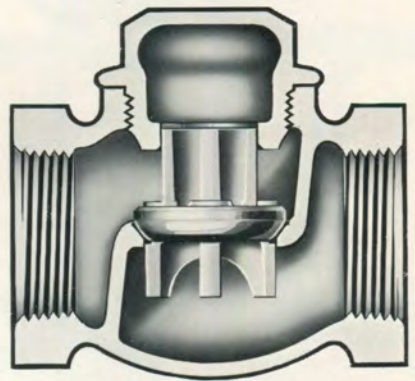
The disc, which is hinged at the top, seats against a machined seat in the tilted bridge wall opening. The disc swings freely in an arc from fully closed position to one providing unobstructed flow. The valve is kept open by flow, with the size of opening varying with the volume of flow. Gravity and reversal of flow seat the disc, thereby preventing backflow.



basic lift check design

Flow through a lift check follows a turning course through a horizontal bridge wall on which the disc is seated. The disc is equipped with a short guide, usually above and below, which moves vertically in integral guides in the cap and bridge wall. The disc is seated by backflow, or by gravity when there is no flow, and is free to rise and fall depending on the pressure under it.

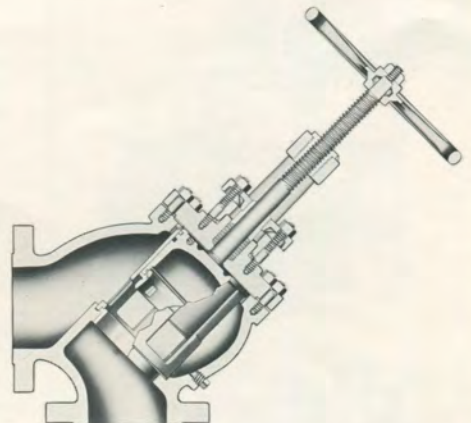
Lift checks are recommended for steam, air, gas, water, and general vapor services.



stop-check or non-return valves

Stop-checks, or non-return valves as they are frequently called, are as functional as pop safety valves on boilers where two or more units are connected to the same header. They automatically prevent backflow from the header should a boiler fail. They simplify the work of cutting out a boiler or bringing a cold boiler into operation. They protect boiler repair or inspection crews against steam backflow should the header valve be accidentally opened. No multi-boiler plant should be without stop-checks.

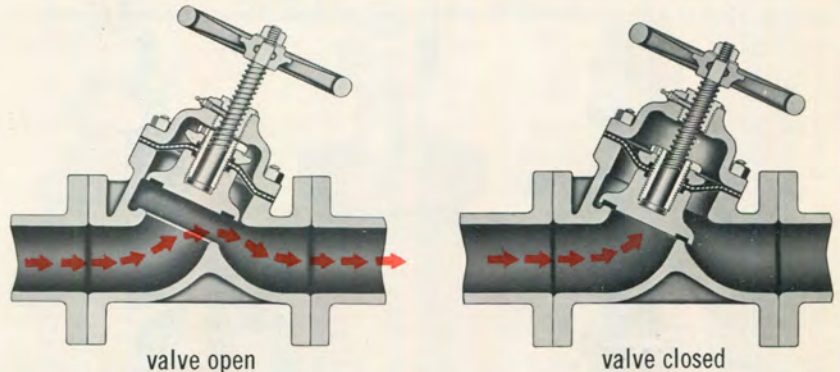
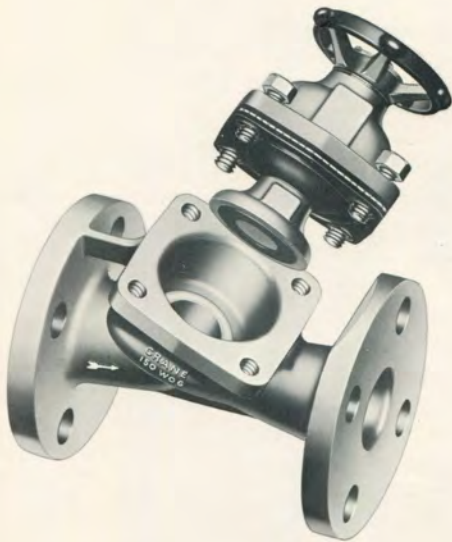
Available in Straight-Way Y-Patterns, Angle Y-Patterns, Globe, and Angle patterns, depending on working pressure.



where packless diaphragm valves fit into piping requirements

With the increasing use in industrial processing of volatile, corrosive, and hard-to-hold fluids, the need of absolute tightness around the stem must often be the primary consideration of valve selection. There's where Crane diaphragm valves best fit into your piping picture. They completely eliminate the need for any stem packing.

On Crane diaphragm valves, the entire bonnet area is sealed off from the body . . . thereby preventing exposure of vital operating parts to the effects of line fluids—such as corrosion, erosion, etc. Conversely, Crane diaphragm valves also prevent contamination of line fluids through contact with the valve's working parts.



how the diaphragm works

The diaphragm serves one function only—sealing the bonnet. It is not subject to crushing and rapid wear. The seating member is a separate circular flat face disc, securely attached to the stem and joined to the diaphragm with a special leakproof connection. This independent seating feature permits positive shut-off with minimum loss of fluid, even should the diaphragm fail.

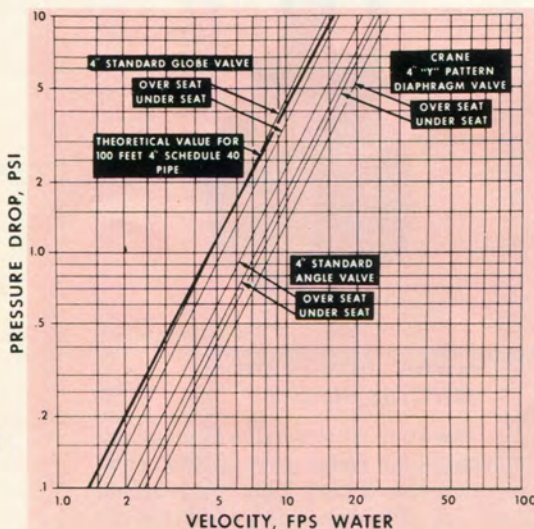
features of CRANE diaphragm valves

- Longer diaphragm service life
- Positive shut-off in case of diaphragm failure
- Greater flow capacity through Y-pattern body
- Minimum turbulence
- Easier operation
- No stuffing box maintenance
- Accurate, tight seating
- Leakproof disc-diaphragm attachment

service recommendations

Iron body diaphragm valves will handle all common services for which iron is suitable at pressures not exceeding 150 pounds, (125 pounds on 6-inch size) at temperatures up to 180 F. Such services include compressed air, water, non-inflammable oils, and compressed or liquefied gases of many commercial kinds.

Neoprene-lined diaphragm valves are for fluids corrosive to iron but non-active chemically on neoprene; also for services where abrasion is a major destructive factor. They give excellent resistance to many corrosive process fluids, to certain corrosive gases, and to solvents, natural and corrosive waters such as mine waters, also for sludges and slurries.



graph shows the excellent
flow capacity of Crane diaphragm
valves in comparison with
standard globe and angle valves

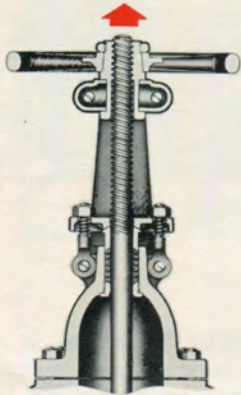
variations in stem operation of gate, globe and angle valves

each type has its own features

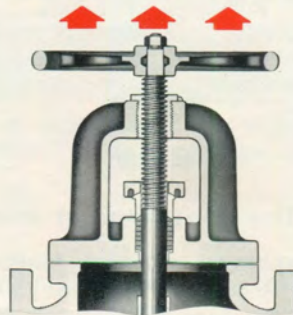
rising stem with outside screw and yoke

In this construction the stem screw remains outside the valve body whether valve is opened or closed. Stem threads are not subjected to the effects of fluids in the line—such as caused by corrosion, erosion, sediment, etc. This construction also permits convenient lubrication of stem threads.

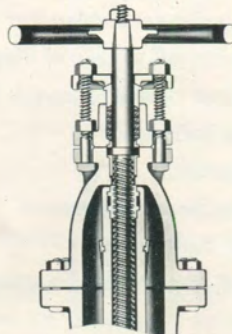
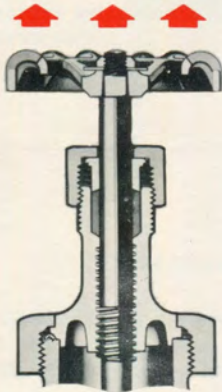
The rising stem shows at a glance the position of the disc. Adequate headroom must be provided for the rising stem when the valve is opened. And the stem should be protected against damage when raised.



Stem rises; handwheel does not



Handwheel rises with stem



rising stem with inside screw

This is the simplest and most common stem construction for gate, globe, and angle valves in the smaller sizes. The position of the stem indicates the position of the disc. The stem should be protected against damage when the valve is open.

non-rising stem with inside screw

Stem does not rise when disc is raised, but merely turns with the handwheel. Ideal where headroom is limited. Since stem merely turns when operated, wear on packing is minimized.



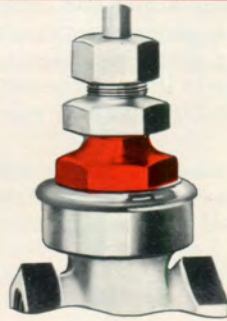
some valves have sliding stems

The stem of the valve is attached to a long hand lever, rather than to a handwheel. This construction—available on both gate and globe valves—permits the operator to open the valve quickly and easily by working the lever. On globe valves, line pressure closes the valve immediately when the lever is released.

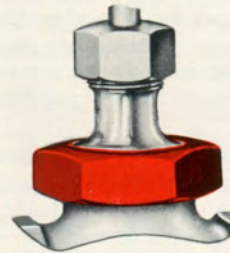
types of bonnet joints on gate, globe and angle valves

which meets your needs best?

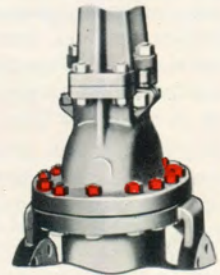
Primarily the bonnet provides a closure for the body through which the stem of a gate or globe valve is operated. Because the bonnet is under pressure when the valve is in service, a pressure-tight connection between bonnet and body is necessary. To provide the construction best suited to various service needs, several types of body-bonnet joints are used.



screwed-in bonnet joint



screwed union ring bonnet joint



bolted bonnet joint

A bonnet joint construction for small gate, globe, and angle valves where frequent dismantling is not required. Ordinarily used on valves for moderate pressures.

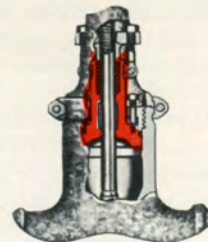
Easy to dismantle and reassemble without danger of injury to body-bonnet bearing surfaces. The union ring gives added strength and rigidity to the body against internal pressure and distortion.

Ideal for services requiring frequent inspection and cleaning of internal valve parts, and for quick servicing of composition disc valves. Its use is restricted to smaller size valves.

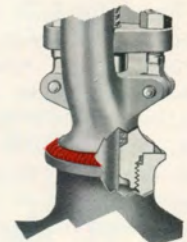
A practical and commonly used design for small and large valves for all pressures and temperatures. Adaptable to all types of gasket joints, ring or flat-face. Multiple bolts, which are easily removed with an ordinary wrench, give equalized gasket pressure to maintain a tight bonnet joint seal.



clamp-type bonnet joint



pressure-seal bonnet joint



lip-seal welded bonnet joint

Ideal where frequent inspection and cleaning of lines are necessary. Easy to take apart. By loosening two nuts, the complete bonnet assembly can be easily removed. Repeated opening does not affect bonnet joint tightness. This construction is found only on certain moderate pressure gate valves.

Utilizes line fluid pressure—not bolts and nuts—to seal the bonnet. The higher the pressure, the tighter the seal. Bonnet joint is inside the valve, sealed with a wedge-shaped seal ring. Internal fluid pressure, acting upon the entire underside of the bonnet, forces the bonnet against the seal ring. This wedges the seal ring between the body and bonnet, forming a pressure-tight metal-to-metal joint. For gate, globe, angle, and stop-check valves in high pressure and temperature services.

Lip seal design features simplicity. Pressure load on the bonnet is carried by a strong thread. The body and bonnet are screwed together until a firm metal-to-metal contact is made between the smoothly machined, flat surfaces on the shoulder of the bonnet and the top of the body. The shoulder of the bonnet is smaller in diameter than the mating area of the body, thus permitting the use of a fillet form of seal weld around the periphery of the connection. Dismantling is accomplished by grinding off the fillet weld and unscrewing the bonnet.

good pressure regulator service starts with proper selection

how to choose a pressure regulator

Never choose regulators on the basis of pipe size. Always select pressure regulators on the basis of their capacity to provide the rate of flow required in the outlet piping. An oversize regulator will give less accurate flow control and have a shorter service life than one that is of proper size.

service recommendations

Pressure regulators are available to provide accurate, automatic pressure regulation on steam and air. They're used in process work, on vulcanizers, cookers, driers, paper machines, heating systems, air tools, air blasts, etc. Also recommended to reduce pressure in lines to engines and pumps, when ample receiver capacity is provided to eliminate pulsations in regulator line.

recommended installation procedure

First, blow piping clear of all foreign matter. Then install the Regulator in a horizontal position at a high point in the line, as close as possible to the equipment being supplied. Arrows cast on Regulators indicate direction of flow.

When Regulators are connected to reciprocating prime movers, it is good piping practice to install an adequate receiver close to the cylinder of the reciprocating apparatus to eliminate vibration in piping and save wear on the Regulator.

A by-pass of proper size should be installed. The by-pass valve should be suitable for throttling and kept tight at all times. Always install a relief valve and a pressure gauge on the low pressure side of the Regulator. See illustration below.

If condensate is present in a line, a steam trap should be installed ahead of the Regulator. Be sure to install a Strainer to screen out foreign matter in line.

Do not use oil, graphite, or other lubricant in a Pressure Regulator.

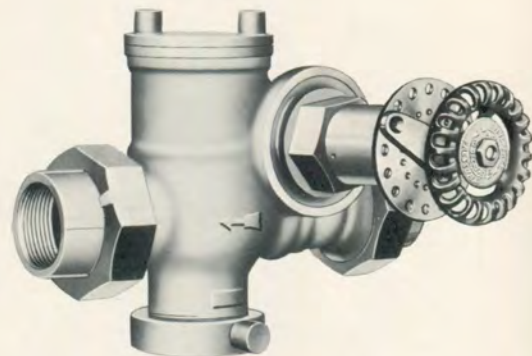
inspection and service

If the Regulator fails to maintain the service pressure for which it is adjusted, the trouble is usually due to foreign matter either in the working parts or on the valve seats. It is not necessary to remove Regulator from the line to locate the source of trouble.

Once the trouble is located, it may be necessary to remove either the main or auxiliary valve for cleaning or repair. For this operation, shut off flow. The steam or air remaining in the line must be exhausted.

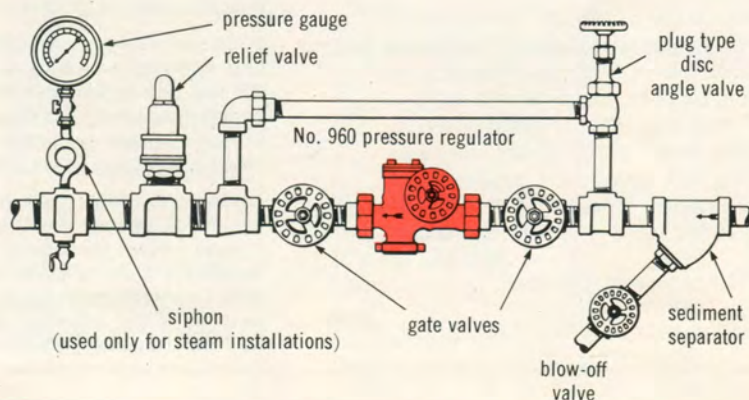
All parts should be thoroughly cleaned, inside and out, before replacing in Regulator body. If necessary, valve seats should be reground.

As with any automatic device, a Regulator should be periodically taken apart, cleaned, and serviced.



Pressure Regulator

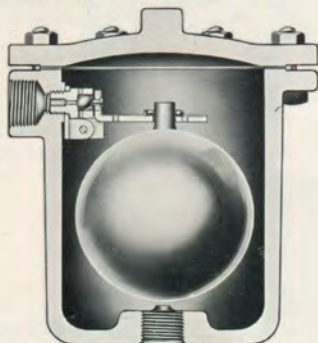
recommended
piping
arrangement
for
CRANE
pressure
regulator





Crane automatic air vent
or water drain valve

cross-section showing
simplified float and
ball-type seating mechanism



range of working pressures:
1 to 150 pounds as air vent valves
1 to 125 pounds as water drain valves

how to use automatic air vent or water drain valves

**they free entrapped air in oil and water
systems . . . they keep air lines dry and clean**

One of the most common causes of sluggish flow and trouble with water and oil piping systems is entrapped air. Where closed vessels and tanks are used, entrapped air may keep them from working properly.

Compressed air systems, on the other hand, constantly accumulate water and oil. Such liquids in air lines are as much a hazard as a hindrance to piping efficiency.

Either of these conditions can be remedied by equipping air, water, and oil piping systems with automatic air vent or water drain valves. Like all well-designed and sturdily built automatic devices, these valves require only routine maintenance.

choosing proper capacity is all-important

Automatic air vent or water drain valves should be selected on the basis of their discharge capacity. Crane recommends the allowance of a safety factor of at least 2 to 1 between the maximum capacity required for the system and the continuous discharge capacity of the valve. See pages 252, 253 in your No. 60 Crane Catalog.

hints on installing

These valves should not be installed where they may be subject to freezing. They can be used only for discharging to regions where pressure is less than in the valves.

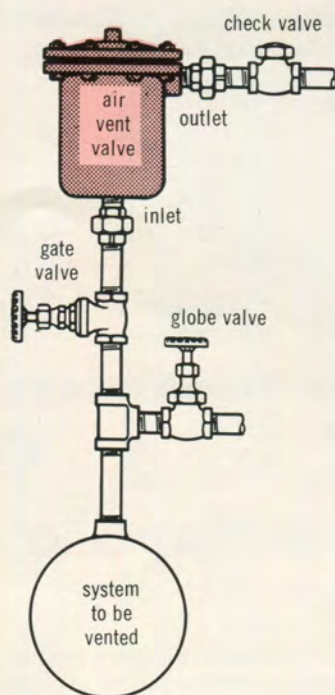
how these valves operate and recommended installation

As air vent valves:

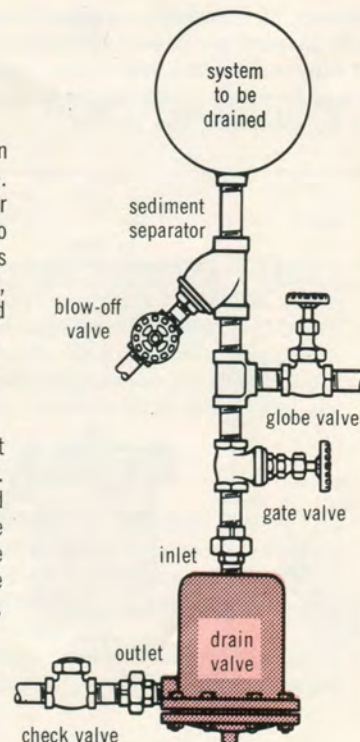
Install the valve in an upright position at the highest point in the system. Always pitch the inlet line upward to the valve. Normally, valve is filled with the liquid in the line. As air accumulates, it displaces this liquid, causing the float to drop, thus opening the valve to release the air. As the air is discharged, line liquid re-enters the valve and lifts the float, thereby closing the valve. Operation is fully automatic and keeps repeating with the accumulation of air in the system.

As water drain valves:

Install the valve in an inverted position at the lowest point in the system. Always pitch inlet line downward to the valve. In air lines, the valve is normally filled with air. As the liquid (water or oil) accumulates, it displaces the air, causing the float to rise and thereby opening the valve. Liquid in the valve is discharged by line pressure. As air re-enters the valve, the float drops and closes the valve to the escape of air. This cycle is automatic and continuous.



typical piping arrangement
for air vent valve



typical piping arrangement
for water drain valve

careful selection and installation assure trouble-free steam trap operation

where you should have steam traps

Steam traps should be installed in lines wherever condensate must be drained as rapidly as it accumulates, and wherever condensate must be recovered for heating, for hot water needs, or for return to boilers. They are a "must" for steam piping, separators, and all steam heated or steam operated equipment.

Crane inverted open float steam traps can be used to return condensate to regions where the pressure is less than that in the trap. They can lift condensate against a head not exceeding the pressure in the trap.

proper capacity is all-important

Steam traps should be selected on the basis of their discharge capacity—and not by pipe size. Capacity is determined by the design and construction of the trap, by the size of the orifice, and the effective seat pressure. See pages 250 and 251 in your No. 60 Crane Catalog.

installation

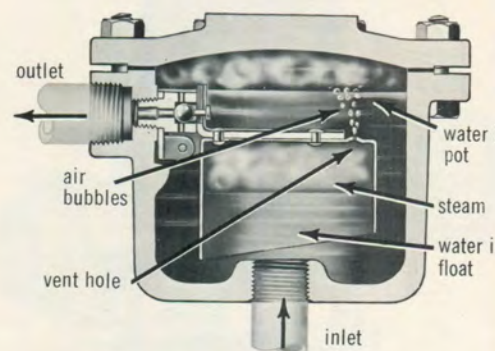
First, blow new lines clear of all foreign matter before installing the trap. Install trap below lowest point in the system with line leading to trap pitched downward to assure good drainage. Always install a sediment separator just ahead of the trap to prevent the entry of foreign matter. Inlet and outlet gate valves permit isolating trap for inspection and cleaning. By-pass line with globe valve makes it possible to rid the system of condensate by hand throttling while trap is out of service.

how to put into operation

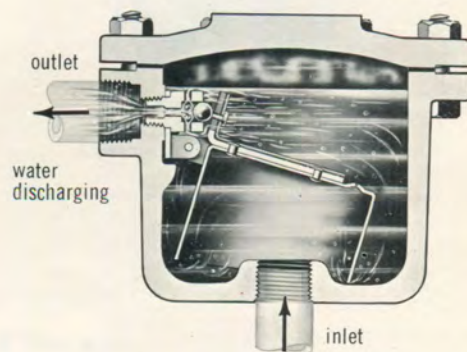
With the gate valve in the outlet line closed, open the inlet gate valve, and allow condensate to fill the trap. Then open the outlet gate valve.

inspect and service periodically

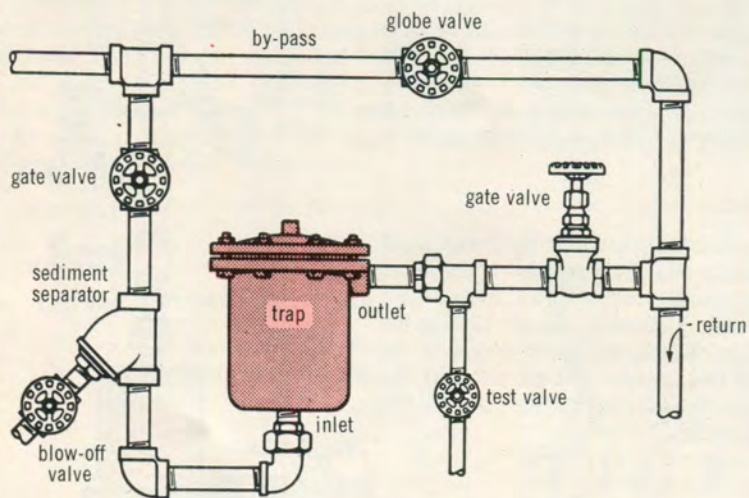
Frequency of inspection depends on condition of the line. To isolate trap for inspection, close inlet and outlet gate valves and open the sediment blow-off or the test valve to relieve pressure. Inspection or repairs can be made while trap is in line or trap can be removed from line easily by loosening the unions.



trap closed—incoming steam under the float bouys the float up, closing the valve.

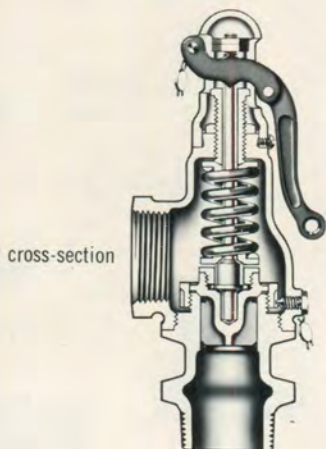


trap open—incoming condensate fills the float, sinks it, and opens valve.



typical piping arrangement for
inverted open float steam trap

for maximum safety, follow instruction tag when installing safety and relief valves



pop safety valves

for steam, air, or gas

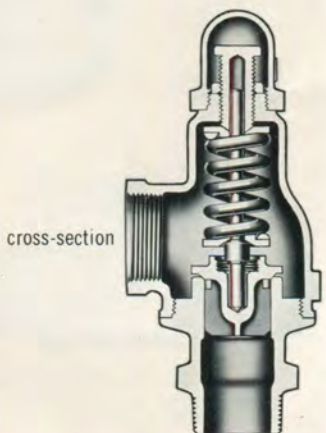
do's and don'ts when installing

No chips, scale, pipe dope, or other matter should be left in inlet of valve or in adjacent connections.

Always install pop safety valves with the stem in a vertical position. For air or gas service these valves should preferably be installed inverted to allow moisture to collect and seal the seating surfaces. Mount valve directly to tank or vessel without any intervening pipe or fitting.

If discharge piping is used, it should be as short as possible, and preferably larger in size than the outlet of the valve. The height of discharge piping should be adequately supported and *never* imposed on the valve. A loose slip joint in the outlet piping is recommended, since it permits expansion and contraction without unduly affecting the valve.

Wrenches should be used with care so as not to abuse or distort the valve. Periodic testing of the valve by pulling the lever is advised. If not operating properly, valve should be returned to the factory—not serviced in the field.



relief valves

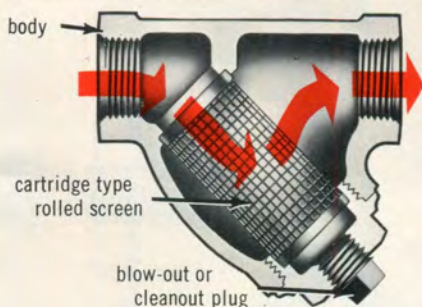
how they operate

installation and maintenance hints

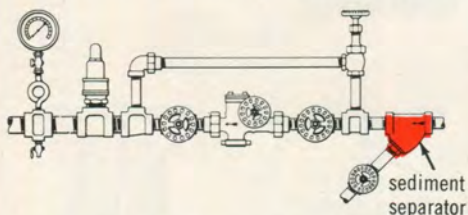
Spring loaded relief valves should be installed with the stem vertical. For air or gas service, these valves should preferably be installed inverted, to allow moisture to collect and seal the seating surfaces. No chips, scale, pipe dope, or other foreign matter should be left in the inlet of the valve or in the adjacent connections.

Whenever piping is installed in the inlet or outlet of these valves, it must be at least as large as the valve connections. Under no circumstances should it be reduced. This piping should be adequately supported to prevent line strains from causing the valve to leak at the seat.

cross-section iron or cast steel Y-pattern strainer



typical strainer installation to protect pressure regulator



No danger of sediment accumulating in this Pressure Regulator. The strainer on the inlet line will entrap foreign matter in the system. Accumulated sediment should be blown out at regular intervals.

dirt means trouble ... stop it with strainers

strainers reduce maintenance cost and lengthen life of valves, regulators, traps, gauges, and all automatic devices in piping

Scale and dirt in piping systems cause endless trouble and frequently serious damage. Such foreign matter lodges on valve seats and starts leakage, gets into the close fitting parts of automatic devices to prevent proper operation, and collects at other points, thereby obstructing flow.

A generous use of strainers or sediment separators is a small but sound investment for any piping system—regardless of how clean the piping materials are when installed.

how a strainer works

Line fluid passes through an extra large screening area that assures free fluid flow with minimum pressure loss. Not only do strainers effectively trap all foreign matter, they also furnish a pocket for its accumulation. Periodic blowing out is only maintenance needed. All internal parts are readily accessible.

The blow-off connection can also be used to drain the line or to remove condensate when starting up, particularly in the case of pressure regulators.

end connections on valves and fittings...an important consideration

Just as a chain is no stronger than its weakest link, a piping system is no better than its connecting links. Specifying the right end connection on valves and fittings is, therefore, of the utmost importance. Be sure you know which type of end connection is best suited to the working conditions of your particular system.

Shown below are the types of end connections most commonly used on valves and fittings, although not all piping materials are available in all types of end connections. Each type has one or more variants, with steel flange joints having the greatest variety.

screwed ends

Screwed end valves and fittings are by far the most widely used. This type of end connection is found in brass, iron, steel, and alloy piping materials. They are suited for all pressures, but are usually confined to smaller pipe sizes. The larger the pipe size, the more difficult it is to make up the screwed joint.

welding ends

Welding ends, available in steel valves and fittings only, are used mainly for higher pressure-temperature services. They are recommended for lines not requiring frequent dismantling. There are two types of welding end materials: butt- and socket-welding. Butt-welding valves and fittings come in all sizes; socket-welding ends are usually limited to smaller sizes.

brazing ends

Brazing end connections are available on brass materials. The ends of such materials are specially designed for use of brazing alloys to make the joint. When the equipment and brazing material are heated with a welding torch to the temperature required by the alloy, a tight seal is formed between the pipe and valve or fitting. While made in a manner similar to a solder joint, a brazed joint will withstand higher temperatures because of the brazing materials used.

solder ends

Solder-joint valves and fittings are used with copper tubing for plumbing and heating lines and for many low pressure industrial services. The joint is soldered by applying heat. Because of close clearance between the tubing and the socket of the fitting or valve, the solder flows into the joint by capillary attraction. The use of soldered joints under temperature is limited because of the low melting-point of the solder.

flared ends

Flared end connections are commonly used on valves and fittings for metal and plastic tubing up to 2-inch diameter. The end of tubing is skirted or flared, and a ring nut is used to make a union-type joint.

hub ends

Hub end connections are generally limited to valves for water supply and sewage piping. The joint is assembled on the socket principle, with pipe inserted in hub end of valve or fitting, then caulked with oakum and sealed with molten lead.

Flanged end materials, although made in sizes as small as $\frac{1}{2}$ -inch, are generally used for larger lines because they are easy to assemble and take down. Flanged joints are made up with much smaller tools than required for screwed connections of comparable size. Flanges which are separate pieces can be attached to pipe in several ways. A few are illustrated.



screwed flange



welding neck flange



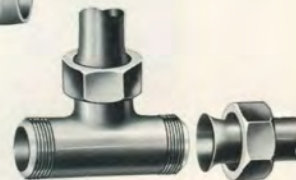
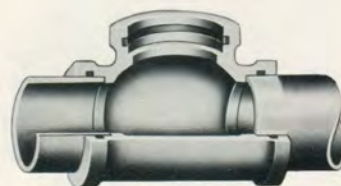
slip-on welding flange



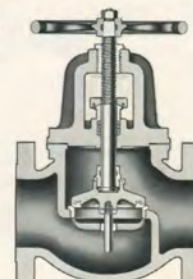
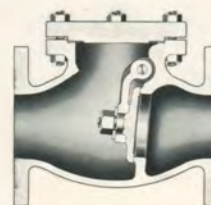
Cranelap flange



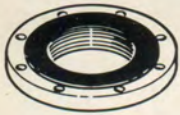
butt-welding ends



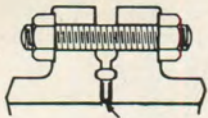
flanged ends



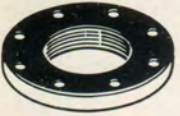
facts you should know about gaskets and packing



flat ring gasket

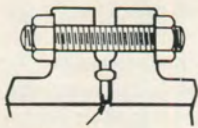


sealing ring



flat full-face gasket

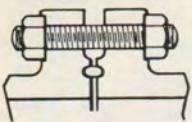
corrosion sealing rings
for ring joint assembly



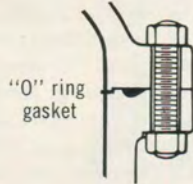
sealing ring



ring for ring joints,
oval or octagonal



steel ring joint assembly



"O" ring
gasket

tight flanged joints depend on gasket selection

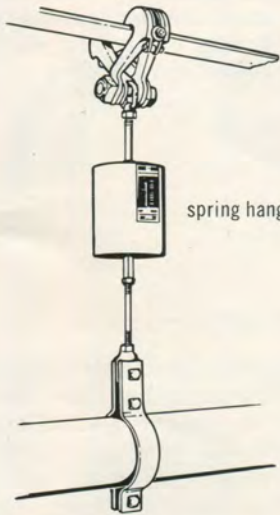
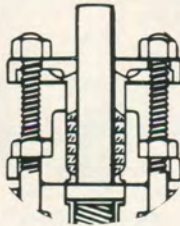
It makes a big difference what kind of gaskets you use in flanged joints. What is good for one service may not last in another. There are three general types of gaskets: (1) flat ring gaskets which cover the face of the flange to the inside of bolt holes; (2) full-face gaskets; bolts are inserted through punched bolt holes; (3) a metal ring of oval or octagonal cross-section which fits into machined grooves in matching flange faces and is used generally in high pressure and high temperature services.

Gaskets are made of various materials: rubber, asbestos composition, and metals. For low pressures and cold services, rubber gaskets are generally used. For cold service at higher pressures, and hot services up to 750 F, asbestos compositions are frequently used. Metallic gaskets are used for intermediate and high temperatures and pressures.

careful valve repacking gives a better seal ...lengthens packing life

The first step in repacking a stuffing box is to loosen the parts to permit easy access. Then remove old packing and clean up the inside of the box. Polish the stem with fine emery cloth to remove all particles or any abrasions. Wipe all parts both inside and outside of the box.

Then insert new packing. After putting in a few rings, tamp well into place, using the packing gland as a tamping tool. Add enough packing to fill the box. Since most manufacturers use split-ring type packing, care should be taken to stagger the ring splits so they are not all in line. Reassemble the stuffing box. A few turns of the handwheel and a few drops of oil will help work in the packing to the stem.



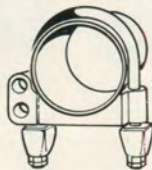
spring hangers

pipe hangers and supports pay for themselves in maintenance savings!

Piping won't stand up and work efficiently without adequate support or suspension. Its own weight plus the weight of the fluid can cause a break in the line, can strain joints to the point of leakage, or even distort or ruin valves.

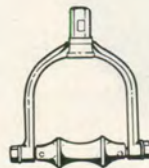
An ample pipe hanger or support at about 10-foot intervals is considered good rule-of-thumb practice for the ordinary installation. However, the spacing can vary considerably according to the size of the line and its gradient. Hangers and supports should be placed close to valves and other heavy pieces of equipment. Extra support may be necessary.

standard ring and
bolt hanger



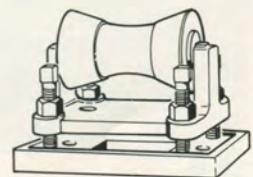
anchor chair

adjustable
clevis and band hanger



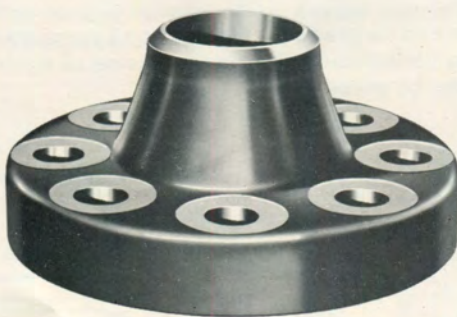
adjustable
swivel pipe roll

single hook



adjustable
pipe roll stand

CRANE MIDWEST welding fittings for maintenance-free service



seamless fittings

Hot-coined fittings (sized in compression) dimensionally accurate from end to end. Fittings formed at controlled heat for superior metallurgical quality with specially machined ends for quick fit-up and welding. Produced by the newest and most modern equipment combined with the latest technologies in hot forming, sizing, heat treating, and machining. Available in all types of fittings; sizes through 24-inches. Larger O.D. sizes, and wall thicknesses greater than Extra Heavy, can be furnished to order.

welded fittings

These fittings are fully heat treated and X-rayed in full compliance with ASTM A 234. Regular fittings and long tangent ells are available in sizes through 36-inches, and on special order through 72-inches. Welded-type fittings can be made in heavy wall (have made up to 5-inch walls) of carbon steel, alloy steels, and other weldable metals. Fittings with extra tangent lengths, reducing ells, and fittings of unusual shape are made best as welded-type fittings.

forged flanges

From selection of raw materials to inspection and testing of the finished product, the highest standards of quality are maintained. Specification requirements are scrupulously followed with controlled forming of maximum radii hub fillets and full range thickness, plus closely-held machining tolerances. Crane stock flanges are available in all types, in sizes through 24-inches; larger flanges to order.

a wide variety of CRANE MIDWEST welding fittings available

Crane Co. manufactures a full product range of welding fittings in two different types—seamless and welded. This versatility, permitting the use of either tubing or plate as raw material makes possible a wide selection of regular welding fittings available from distributor stocks and special fittings designed to meet unusual piping requirements. Crane's rich background of technical knowledge is at your disposal in designing and producing every type of welded fitting and flange for every type of application.

a few standard fittings



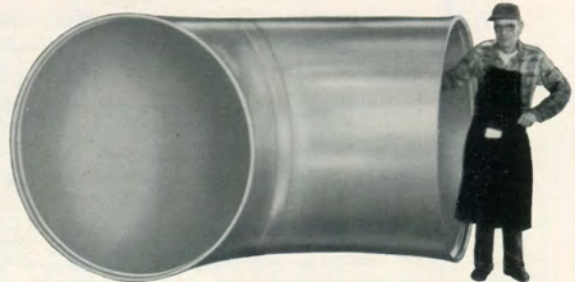
a few special fittings



20-inch O.D. x 4-inch wall short radius elbow made from 2 1/4% chrome, 1% moly alloy steel. Service: hot reheat piping for 2300 psig, 1050 F.



42-inch O.D. ell with 28" radius, made with and without 6" tangents. Material: A-201-B steel.



Smooth-flow, large O.D. ells like this were first produced by Crane for nuclear power stations. The 60-inch example illustrated met all requirements of the steam turbine piping system . . . a departure from the mitre welded ells that offer limited efficiency.

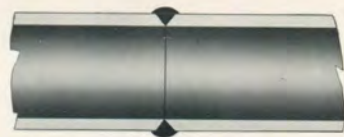
welded pipe joints are maintenance-free joints

The practice of welding pipe joints—once limited to large piping—is now used for all sizes of high pressure-temperature lines and for general service installations.

Because the technique of welding is a specialized operation, no effort is made here to describe actual procedures. Such information would take more space than is available in this booklet. Instead, this section merely attempts to show the wide variety of welding materials—valves, fittings, flanges, etc.—which are regularly available.

butt-welded joints

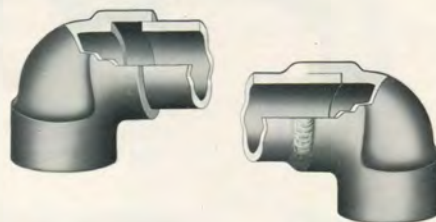
Butt-welded joints are designed to combine serviceability with ease of installation. Butt-welding consists of beveling the two ends, lining up the two openings, and then making the circumferential butt-welds.



socket-welding joints

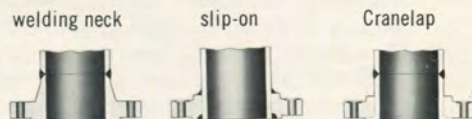
Socket-welding simplifies the welder's task. Socket-welding fittings have deep sockets with ample "come and go," hence pipe need not be cut to precise lengths.

The socket type weld has advantages over the butt weld that recommend it strongly for smaller size piping. Pipe doesn't have to be cut accurately unless it must be butted against fitting shoulder. Since the pipe end slips into, and is supported by, the socket, the joint is self-aligning. Tack welding, special clamps to line up and hold the joint, and backing rings are unnecessary. Pipe used in socket-welding does not require beveling. "Icicles" and weld spatter cannot enter the pipe.



welded flanged joints

Welding is also used in joining flanges to piping. These welded joints are superior to screwed flanged joints because the possibility of leakage through the thread is eliminated. The full thickness of the pipe wall is maintained, and the welded flange becomes an integral part of the pipe. Shown are three typical methods for making such joints.



brass solder-joint angle valve



wrought copper solder-joint elbow

making up a solder joint

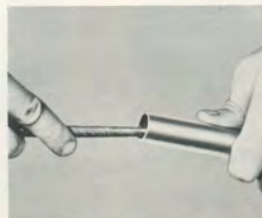
In this type of connection, the pipe is joined to the valve or fitting with solder. Copper tubing is the most commonly used material for making up solder joints. The correct procedure for making such joints is illustrated.

Cut tubing to length and remove burrs. Start by cutting tubing to length, making sure end is square. Use a fine hacksaw blade. Remove all burrs with file or scraper.

Clean tubing and valve or fitting. Clean outside end of tubing and inside end of valves or fitting thoroughly with medium grade sandpaper or emery cloth. Next, wipe or brush away all emery dust and metal particles. A dirty solder joint will not hold.

Apply flux and heat. With a brush, apply thorough and even coating of flux to outside end of tubing and inside end of fitting. In cold weather, warm up the parts with a torch to 70 or 80 F. Slip tubing in fitting and turn back and forth once or twice to distribute flux evenly. The joint is now ready for soldering.

Solder the connection. Heat the joint to good soldering temperature. Feed solder filling the joint completely. Wipe off excess and the connection is made. Don't solder too hot or cold. Flows best at proper temperature; burns when too hot.



1



4



2



5

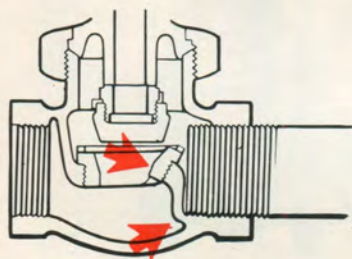
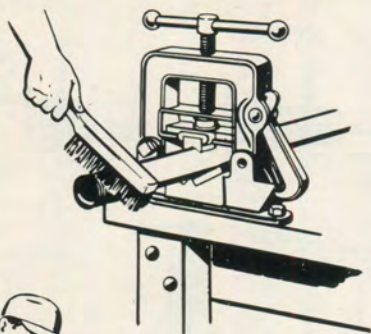


3



6

how to make up a screwed joint



The screwed joint (threaded male and female ends screwed together) is the most common method of joining pipe. A high degree of standardization is maintained in the threading of piping materials. American Pipe Thread Standards guide the piping industry.

The chart below shows the normal engagement male and female threads for making up screwed joints.

use a wire brush

Since dirt can make a good fit impossible, the first thing to do is to wipe both male and female threads clean. Wire brushing is recommended, especially if threaded pipe has been exposed to weather. Running a tap or die over the threads will usually straighten any that may be damaged and will help to assure a good metal-to-metal joint.

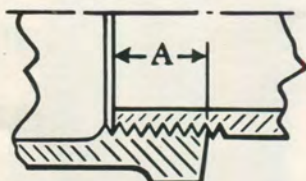
lubricant is good - but not inside a line

Next, use a bit of good thread lubricant or "pipe dope," but put it on the *male threads only*. This prevents any excess from squeezing into the pipe and causing harm to valve seats or other mechanism. Lubricant reduces friction when pulling up a joint. It is not expected to seal the joint, or to compensate for poor workmanship.

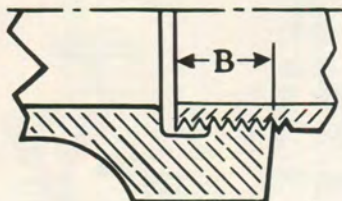
With lubricant applied, start the joint by hand. If the thread engagement feels "right," turn it up as far as it will go. If the threading job is up to standard . . . and if the threads are free of dirt . . . the joint is now started right. Further turns with a wrench will complete the job.

pipe run in too far

But be careful with the wrench. Never use an oversize one that will tempt you to "lean on the joint." Too much pull up can cause damage, especially in the case of valves. Don't try to run all the male threads into the joint. The lead of the die always leaves a few imperfect and unusable male threads which should be left exposed.



American Standard
and A.P.I. line
pipe threads



shoulder type
drainage
fitting threads

normal engagement between
male and female threads
to make tight joints

DIMENSIONS, IN INCHES

Dimensions given do not allow for variations in tapping or threading.

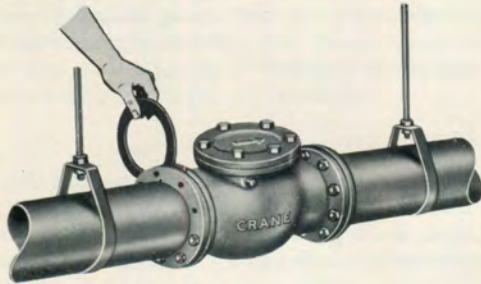
Size	1/8	1/4	3/8	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2
A	1/4	3/8	3/8	1/2	9/16	11/16	11/16	11/16	3/4	15/16
B*						9/16	5/8	5/8	5/8	7/8

Size	3	3-1/2	4	5	6	8	10	12	14
A	1	1-1/16	1-1/8	1-1/4	1-5/16	1-7/16	1-5/8	1-3/4	
B*	15/16	1	1-1/16	1-3/16	1-1/4	1-3/8	1-9/16	1-11/16	1-7/8

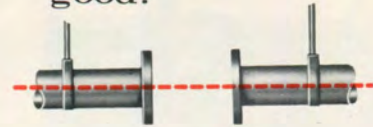
*Using American Standard Taper Male Thread with Crane shoulder type Drainage Fittings. The external thread, however, should not be threaded small to gauge and not more than one turn large.

how to assemble a flanged joint

Flanged joints are made up by bolting two flanges together with a gasket between their machined faces to assure a tight seal. The proper steps in assembling a flanged joint are shown below.



good!



bad!



clean all parts

As with screwed joints, all parts should be clean to assure best results. Use a solvent-soaked rag to remove the rust-preventing grease put on flanges at the factory. Next, clean off all dirt and grit particles. Then wipe off the gasket just to be sure it is clean.

align and support pipe

When the pipe is in place, be sure it is properly supported. For example, a valve cannot hold up an unsupported length of pipe without undergoing great strain. The flanges should be accurately aligned—by checking with a spirit level, both horizontally along the pipe and vertically across the flange faces. It is then ready to be bolted tight.

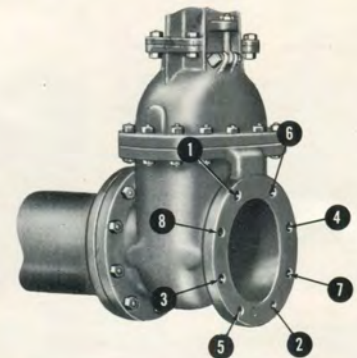


insert gasket

With the flanges secured in position, slip in half the bolts at the bottom. They will hold the gasket in place. Gaskets should be coated with a little graphite and oil or other recommended lubricant before they are inserted. They are then easier to remove if the joint is opened later. Finally, slip in the rest of the bolts, apply a little thread lubricant to each, and then turn up all nuts by hand, far as they'll go.

it's best to tighten bolts in this order

Now start pulling up with a wrench—not in rotation, but by the cross-over method to load the bolts evenly and eliminate any concentrated stresses. Keep repeating by going over and across until the joint is uniformly tight.

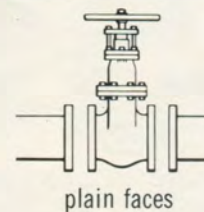


flange facings should be alike

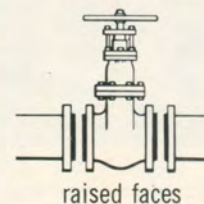
Do not attempt to get a tight flanged joint with flange faces which are not alike. Steel valves and fittings normally are manufactured with raised flange faces. Piping materials in iron and bronze usually have plain or flat flange faces.

As shown, the proper procedure is to join a plain face to a plain face—or a raised face to a raised face. The proper gaskets will assure a tight joint. But never should a raised face be joined to a flat or plain face.

When joining 125-pound iron or any bronze flanges to steel flanges, be sure to remove the raised face on the steel flange. A full faced gasket is preferred for such a joint.



plain faces

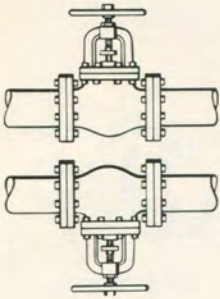


raised faces

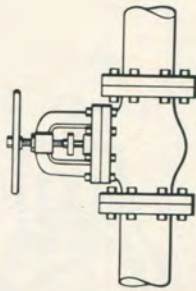


hints on installing valves... gates, globes, angles and checks

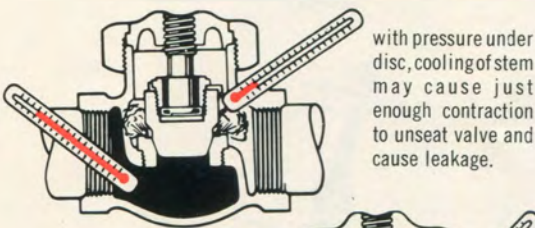
stem up—
always best!



stem down—
not recommended

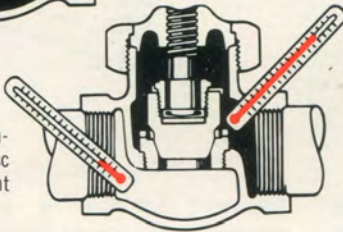


stem horizontal—
not practical
with some valves



with pressure under
disc, cooling of stem
may cause just
enough contraction
to unseat valve and
cause leakage.

pressure and tem-
perature above disc
help insure tight
seating.



most manufacturers
plainly mark check
valves for direction
of flow.



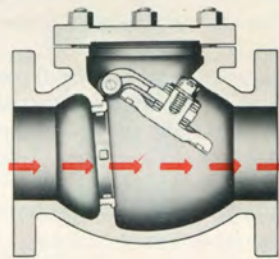
what's the best working position for any valve?

Valves work best when standing upright, with the stem pointing straight up. Any stem position from straight-up to horizontal is satisfactory, but still a compromise. Installing a valve with its stem down is not good practice. With a valve in this inverted position, the bonnet acts as a trap for sediment which may cut and damage the stem. Upside down position for valves on liquid lines subjected to freezing temperatures is bad because liquid trapped in bonnet may freeze and rupture it.

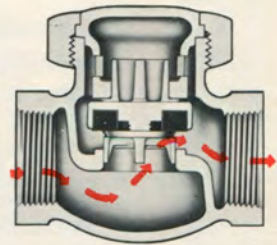
pressure above or below the disc - which is better?

This question, which applies to both globe and angle valves, has several answers, because service conditions vary. On lines where continuous flow is desired, it is safer to have pressure below the disc. For example, a disc may become separated from its stem and automatically shut off flow if pressure is above the disc. If this is dangerous for certain installations, then the pressure should be below the disc.

In general, however, unless pressure under the disc is definitely required, a globe or an angle valve will give more satisfactory service when installed with pressure above the disc. An exception is a valve with a renewable composition disc which, preferably, should have pressure below the disc to assure longer disc life.



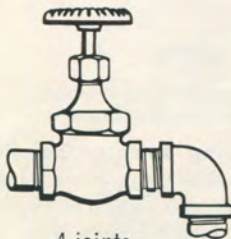
iron body
swing check valve



brass
lift check valve

follow the marking when putting check valves into lines

Primary caution to be observed when installing any check valve, whether swing or lift check type, is to see that flow enters at the proper end, i. e., that the disc opens with flow. If you follow the marking on the body of the valve, you can be sure the valve is properly installed and that the disc will be properly seated by backflow, or by gravity when there is no flow.



4 joints
here



2 joints
here

use angle valves to save pipe joints

As shown above, it is good piping practice to use an angle valve wherever possible when making a 90° turn in a line. Not only does an angle valve give less restriction to flow than the elbow and globe valve it displaces, it also reduces the number of joints in a line and saves on erection time.

helpful hints on handling piping materials

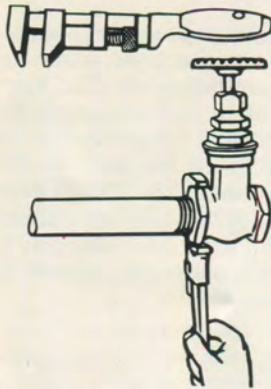
know your wrenches

easy does it with the proper tools

Good handling of piping materials begins with knowing the proper tools to use—and how to use them. Wrenches are important tools on every piping job. When used improperly, however, they can cause considerable damage. Two simple rules regarding wrenches can keep you out of trouble:

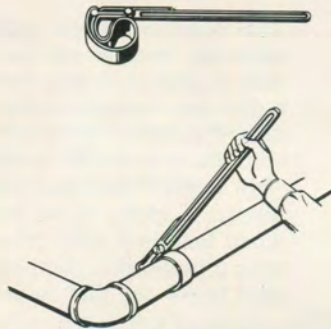
Rule 1: choose the right type.

Rule 2: choose the right size.



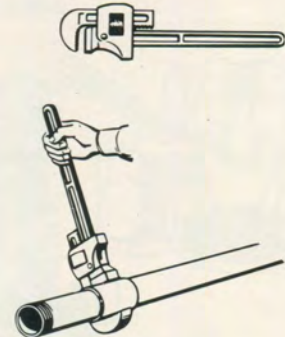
hex and monkey wrench

Your hexagonal or monkey wrench—with its smooth, square jaws—is always your best bet for hex end valves and fittings. It gives a better fit on the part to be turned, and doesn't have the crushing effect of a pipe wrench. Because of the shape of their jaws, hex or monkey wrenches obviously cannot be used on pipe or other round objects.



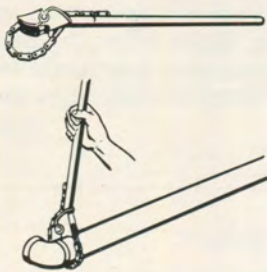
strap wrench

Strap wrenches are used mainly when working with plated or polished materials to avoid marring the surface. They also come in handy in tight places where you can't get in with a pipe wrench.



pipe wrench

Designed for use on pipe and screwed end fittings only. Not as efficient as a monkey wrench on hexagonal ends. The harder you pull a pipe wrench, the tighter it squeezes. This squeezing action can do great damage to a valve. It may cripple or even crush its body.



pipe tongs or chain
pipe wrench

Pipe tongs are wrenches of the chain strap and lever type. They are generally used for larger sizes of pipe—about 3-inches and above—although they are available for sizes down to $\frac{1}{8}$ -inch.



open end wrenches

Open end or socket wrenches are most suitable and fastest to work with when pulling up flange bolts and nuts. Getting the right size is the most important consideration here. Slippage of the wrench can cause bruised knuckles and can wear nut and bolt heads round.

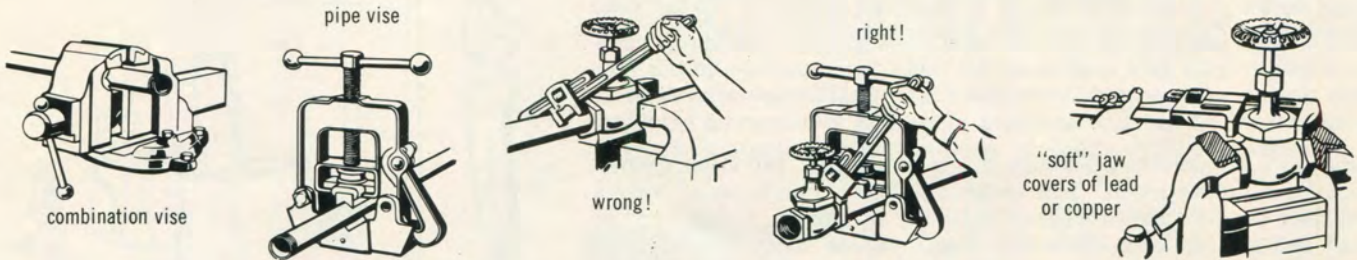


too much leverage
is dangerous

Avoid bearing down on the joint with an oversize wrench or a wrench with an extension handle. It often gives you more leverage than you need, and may result in pulling up a joint so tight that the fitting will be cracked, the valve twisted out of shape, or the pipe run clear into the seats.

helpful hints on handling piping materials

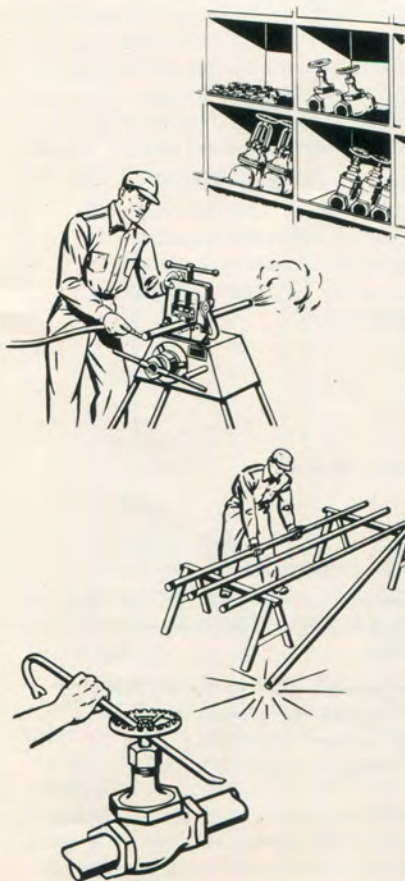
know your vises



The two most common types are shown. The pipe vise is used for pipe only. The combination vise, having square and gripper jaws, is suitable for other work as well as pipe. Experienced piping men never put a valve or fitting in the vise when making up a joint. There's too much danger of squeezing the part and causing distortion, or of forcing the working parts of valves out of line.

Put the pipe in the vise—not the valve. Then turn the valve or fitting. Always put your wrench on the end of the valve or fitting being made up. This gives better leverage and prevents possibility of twisting unsupported valve body, or hurting its working parts.

Use copper or lead covers on vise jaws when holding a valve for repair work. This prevents damage to finished surfaces. Valves should be placed in vise with valve ends—not valve sides—between the jaws, as a precaution against damaging valve body.



beware of dirt - it's your biggest piping headache

Any foreign matter in pipe lines—dirt, sand, rust, scale, metal chips, burrs—is a menace. Sooner or later, it cuts and damages valve seats. Leakage results.

The protectors put on valve ends at the factory should not be removed until valves are installed. Storing piping materials properly with the best protection possible will pay dividends after installation.

blow out all pipe before installing

It may prevent breakdowns later. For it's easy for sand, dirt, and scale to accumulate in pipe stored in a yard or shed. Also, blowing out can remove dirt that may have settled in the line. Use compressed air to blow out pipe, or swab it out thoroughly. Never fail to take this precaution, not only for new materials but when using old materials.

flush every new installation before putting into service

Before any new piping installation is put into service, it is good practice to open all valves wide and flush or blow out thoroughly. This removes any loose scale or foreign matter that may be present.

why take a chance on damaged threads

When threaded ends are damaged—avoid taking chances with the joint. If the end is badly damaged, cut it off and re-thread. Usually the damage can be repaired by running a die over the threads to clean up and straighten them. Damaged female threads can usually be repaired by screwing a tap into them.

If a valve won't operate easily, don't try to overcome it by brute force. Avoid putting a wrench on the wheel for extra leverage. You may damage the valve in any number of ways.

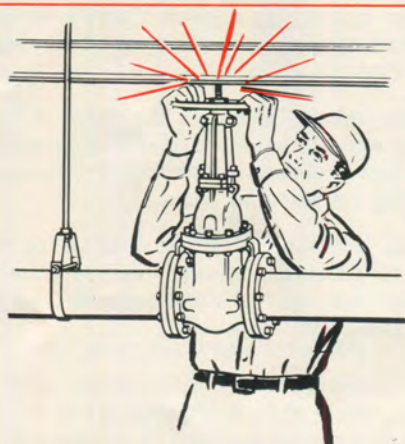
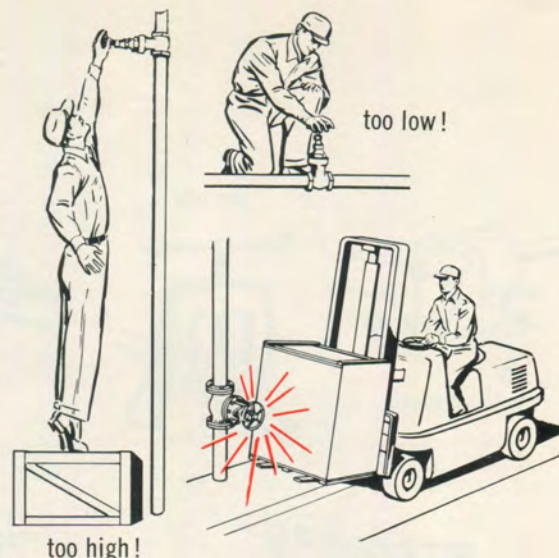
To close a valve properly, bring the disc to its seat gently, back it off a turn, and repeat two or three times. This action will probably flush away whatever foreign matter had lodged on the seat. If it doesn't, take the valve apart, inspect and clean it.

do's and don'ts for better piping service

Almost as important as getting the right valve, is getting the right valve installed in the right place. For you can't expect a valve to contribute to the over-all efficiency of your piping system if it's installed in some unhandy spot—or in a spot where it may be abused.

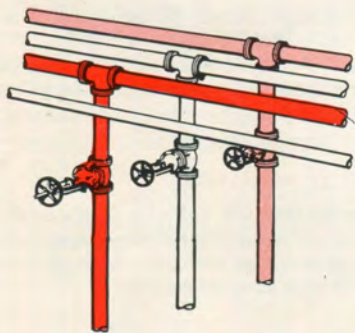
locate valves for convenient operations and for valve safety

Valves can't be operated efficiently if the handwheel can't be reached except by a contortionist. You encourage better operation of valves when they can be reached without difficulty or danger. Valves can't be abused and still operate efficiently. Don't expose them to damaging blows. A bent stem not only cripples a valve, but may cause a shut-down that results in costly delay and repair.



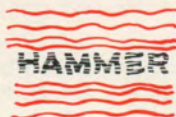
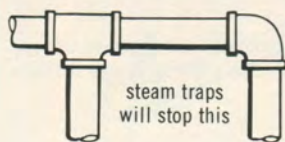
give valves plenty of headroom

Merely being able to open a valve is not enough. If lack of clearance prevents *full* opening, excessive pressure drop, disc vibration, and quick wear on valve seats will result. Be sure to allow ample room for repacking stuffing boxes to remove stem and bonnet for inspection.



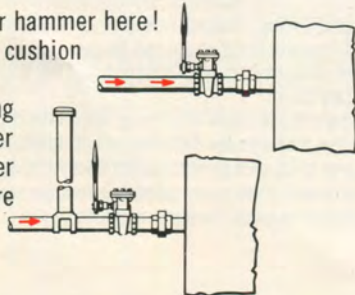
identification of lines helps both you and the operator

Good piping practice requires the proper identification of all lines. Operators should know the functions of every line so that valves can be operated quickly and properly in case of emergencies. Lines are normally identified as to their purpose by (1) tags, (2) plates, or (3) painted color identification.



water hammer here!
—no cushion

cushioning chamber stops water hammer here



hammering in lines does serious damage

Steam Lines—Condensate or slugs of water in steam lines can be dangerous. It can rupture joints, valves, or fittings; it can loosen anchors or supports. Eliminate this hazard by providing adequate drainage, using steam traps when applicable.

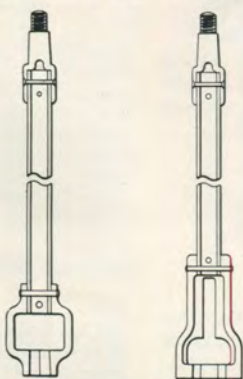
Liquid Lines—Sudden stoppage of flow in liquid lines can cause water hammer. It can do serious damage. Adequate air chambers or other cushioning devices should be installed ahead of quick-opening valves.

valve operators and accessories are convenient... save time and labor

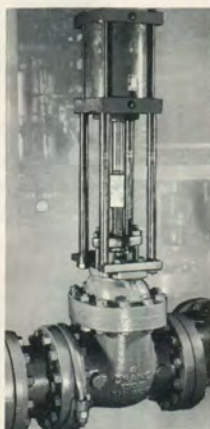
Valve operators are almost indispensable accessories for cutting operating costs and manpower in many plants. They are especially valuable on large valves requiring considerable power to open and close. Cylinder and motor operators are ideal for hazardous and hard-to-reach locations and for valves that must be operated frequently. Controls can be provided integrally or at remote positions and can be programmed to respond to practically any signal or operating cycle requirement.



CRANE CONVERTO-GEAR OPERATORS are standardized, easily mounted gear operators for rising stem and non-rising stem gate valves. They are completely self-contained units, totally enclosed and permanently lubricated. They can be factory installed on new valves or can be used for field conversion to gear operation, usually without removing valves from the line. Changeover is simple and fast with the complete conversion kits provided with each operator.



EXTENSION STEMS are frequently required for valves that are to be operated from a distance. Ordinarily a floor stand is used to support the stem and hand-wheel, but in many installations only the extension stem is used. Extension stems that are long must be rigidly and properly guided with supporting brackets. Extension stems can be furnished for outside screw and yoke gate valves, non-rising stem gate valves and for globe and angle valves.



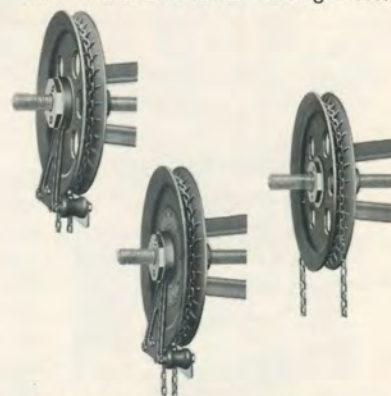
CYLINDER OPERATORS are actuated by means of double acting pistons and cylinders using water, air or oil as the operating medium. Control is obtained by operating a four-way valve located in any convenient place within reasonable distance from the cylinder. Such operation of valves is becoming a necessity in many plants where speed of opening and closing valves is essential to complex process piping systems.



FLOOR STANDS are suitable for operating either non-rising or rising stem valves. They are available either with or without indicators and can be supplied with bell bottom bases for use on non-rising stem gate valves projecting above floor lines.



"CRANE TELEDYNE" MOTOR OPERATORS are light-weight and compact yet rugged enough to withstand the most severe and continuous operation. The unit is readily adaptable to valves in the field or is available on fully motorized Crane valves direct from stock. "Crane Teledyne" is available with push button control, or it can be programmed for automated operation. The motor operator is equipped to act as an manual gear operator in case of electrical emergencies.

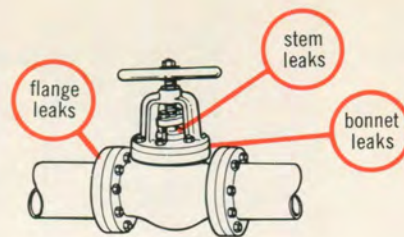


CHAIN WHEELS are for convenience in operating valves above a normal reach from floor levels. They are designed to provide a positive grip on the chain under the most severe operating conditions. Guides hold the chain in close contact with a large portion of the circumference of the wheel preventing slipping or jumping of the chain. Hammer blow chain wheels are recommended to facilitate opening and closing large size or high pressure valves.

routine maintenance assures satisfactory valve performance

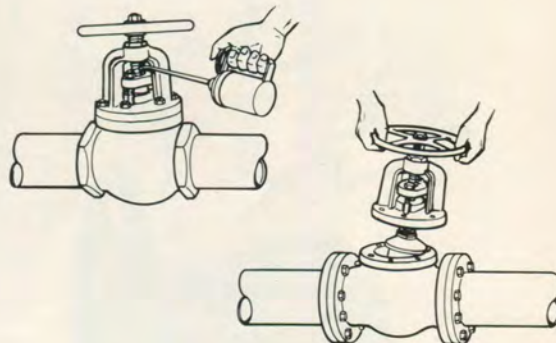
don't overlook leaks ... big or small

A leak in a valve often can be remedied simply and in a hurry, if caught in time. Stem leaks normally can be fixed by slightly tightening the packing nut or gland. Bonnet and flange leaks can be caused by bolts loosening under service strain. If tightening the joint doesn't stop the leak, then inserting a new gasket probably will.



don't spare the oil can

Wear on stem packing is due mainly to the rising and turning motion of the valve stem, combined with deteriorating effects of service conditions. A few drops of oil on the stem, now and then, help to reduce friction—and wear. Don't forget to lubricate exposed stem threads.

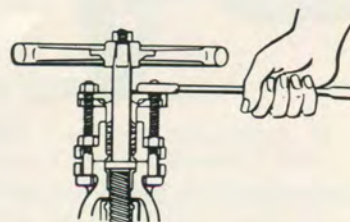


periodic inspection ... the best preventive maintenance

Most valves are designed to permit periodic inspection without seriously interrupting service. Without removing the valve body from the line, the complete bonnet and disc assembly can be removed for cleaning and inspection. Seating surfaces in the body can be checked at the same time.

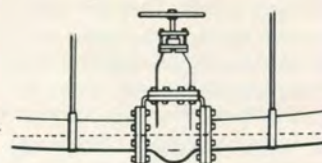
"pull up" evenly on packing gland ... repack when it's necessary

Stuffing box leaks usually can be stopped by merely "pulling" up the packing nut. On bolted glands, care must be taken to tighten bolts evenly ... as severely cocking the gland will bind the stem. If the stuffing box must be repacked, it usually can be done while the valve is in service.

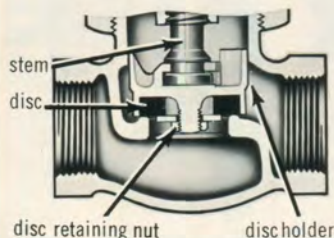


don't get caught with your pipe hangers down

Merely having your system equipped with pipe hangers is not enough. Pipe hangers must function not only before, but after, a system is put into service. It is good piping practice to check hangers as well as valves. If a line seems to be settling, or sagging in spots, a few turns on the hanger adjustment will restore the pipe to proper position.



renew a composition disc at first sign of a leak ... it's easy ... it saves the seat



Replacing a composition disc as soon as a seat leak is discovered saves the seat and will add much to the valve's life. The procedure ... as outlined at right ... is simple. It's done in a matter of minutes, and avoids the problem of serious interruption of operations.

use the right disc for every service

Another big advantage of composition discs is that by changing the type of disc, you can quickly change the valve to suit other services. In effect, a new disc makes a new valve. Discs for these "all purpose" valves are available for steam, hot and cold water, air, oil, gas, and gasoline. No big inventory of replacements is necessary. A few extra disc-holders and a supply of discs are all you have to carry.

STEP ONE. Turn stem to fully open position. Loosen the bonnet and lift out the complete stem and disc assembly.



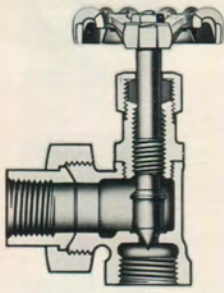
STEP TWO. Turn stem down slightly. Remove the disc holder ... install a new one. Reassemble ... and your valve is back in service.



STEP THREE. Put a new disc in the holder at your convenience. Unscrew disc retaining nut on underside of holder ... replace disc and tighten nut.



other types of valves often used
in piping systems



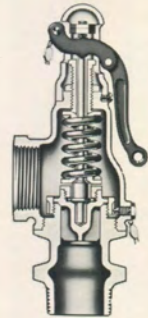
needle point angle valve



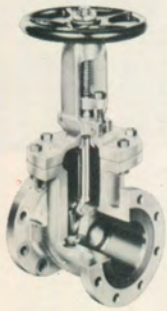
foot valve with leather disc



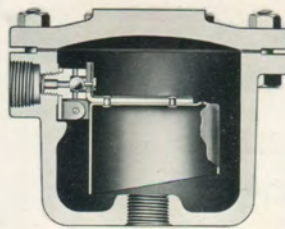
relief valve



pop safety valve



flexible disc gate valve



inverted open float steam trap



brass hose gate valve



ball valve



pressure-seal bonnet valve



quick-opening
brass gate valve



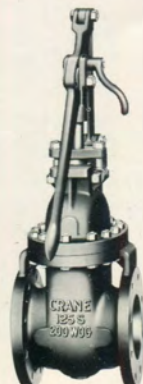
motor operated valve



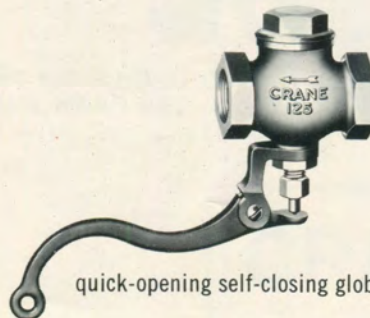
outside lever and weight check valve



iron cock



quick-opening iron gate valve



quick-opening self-closing globe valve



butterfly valve

CRANE quality ...

the standard of quality in piping materials

Crane has never lost sight of the importance of maintaining the highest possible degree of quality control. By constantly adding to research and design experience as well as to manufacturing skill, Crane is able to mass-produce piping materials that consistently set the standard for quality in every field they serve.

Elaborate research and engineering procedures make sure that raw materials are right . . . that design and specifications are sound. Castings and forgings are skillfully inspected . . . dimensions and wall thicknesses carefully gauged. Repeated checking insures closest tolerances and accuracy in all machining operations, followed by final inspection of parts. All assembled products must undergo thorough tests simulating actual working conditions before they are released for shipment or stock.

Even then, no Crane product is ever considered to be beyond improvement. Betterment of design and refinement of materials are constantly being studied to increase the serviceability and performance of Crane valves and fittings in all their applications in every field of industry.

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